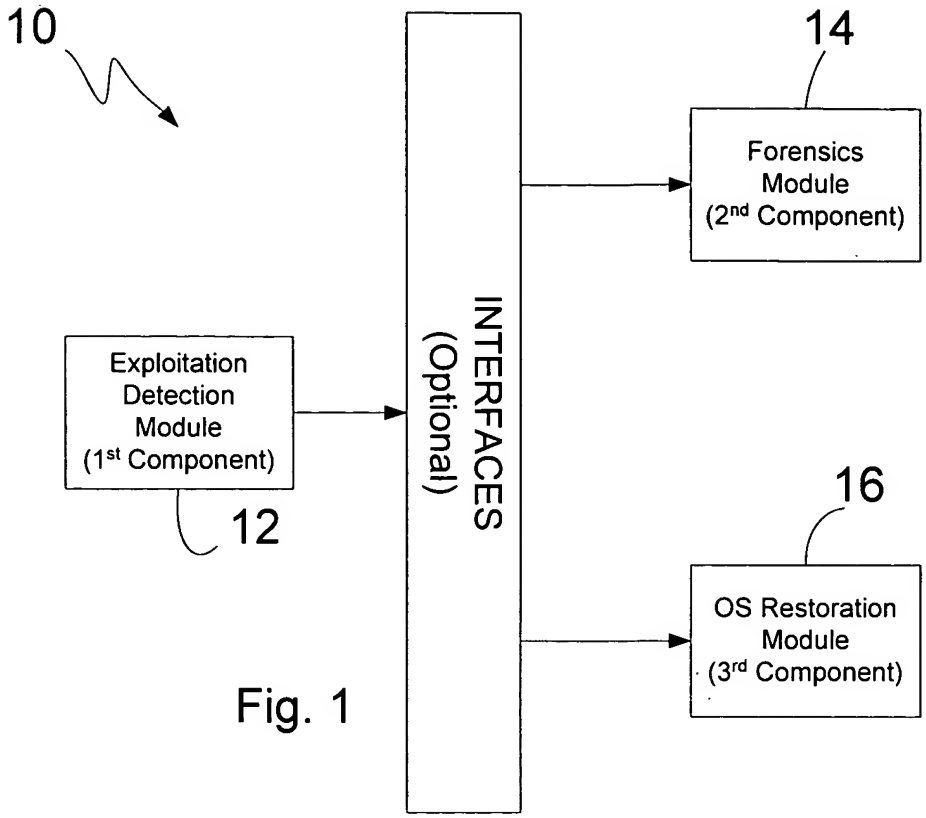
10
14
Forensics Module (2nd Component)
INTERFACES (Optional)
Exploitation Detection Module (1st Component)
12
16
OS Restoration Module (3rd Component)

Fig. 1

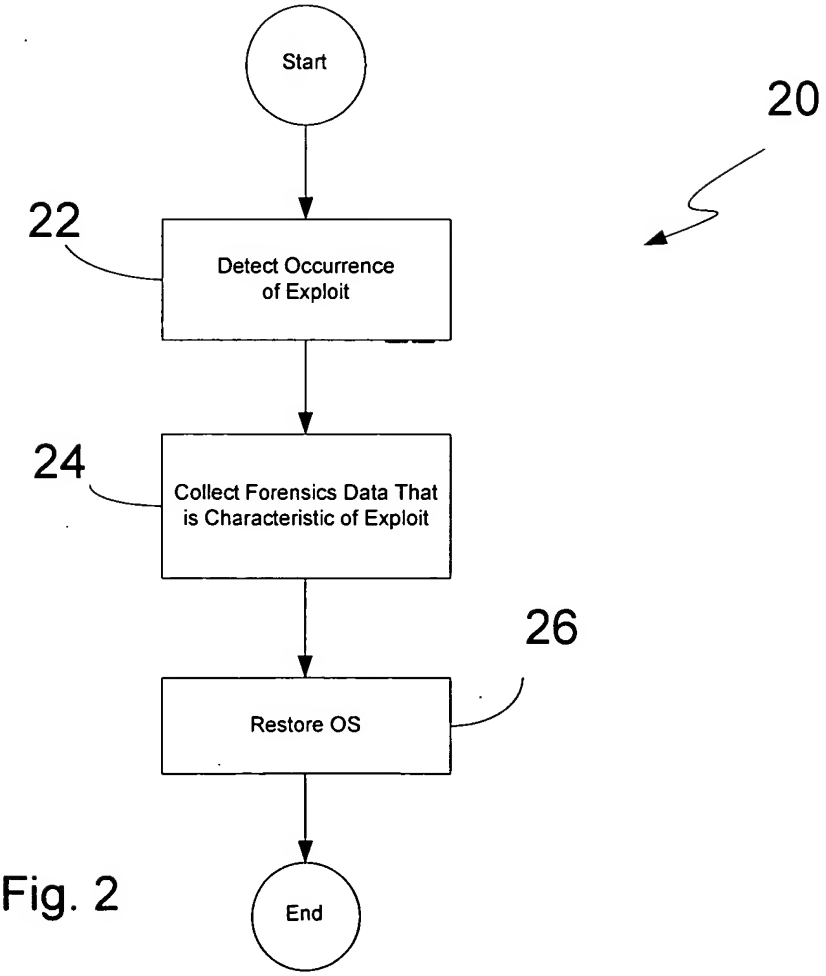
Start
20
22
Detect Occurrence of Exploit
24
Collect Forensics Data That is Characteristic of Exploit
26
Restore OS
End

Fig. 2

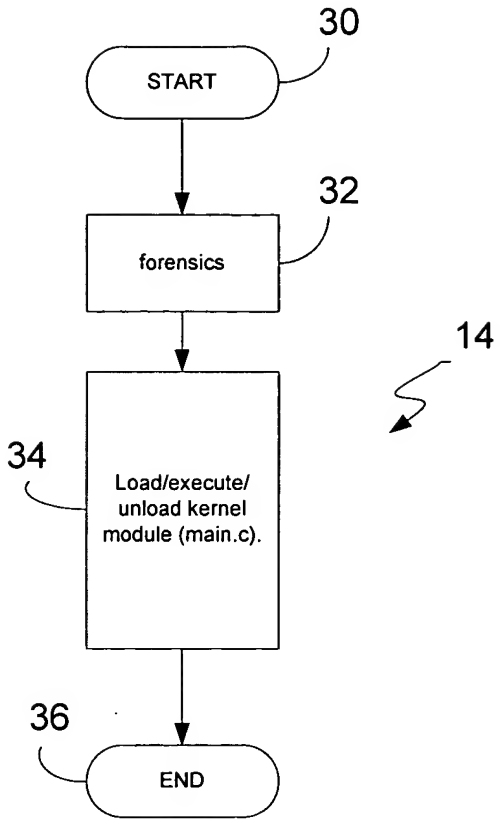

FIG. 3

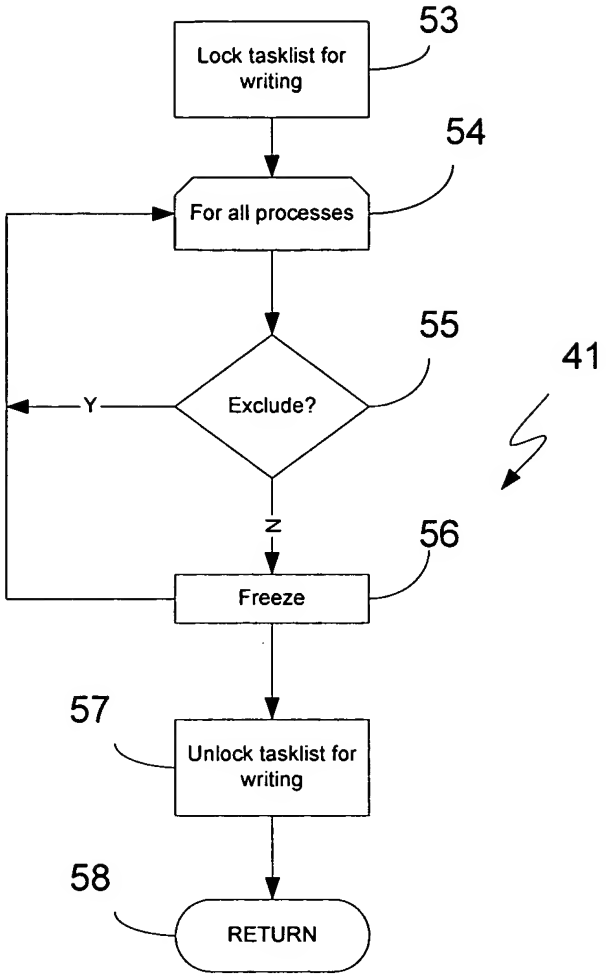

FIG. 5

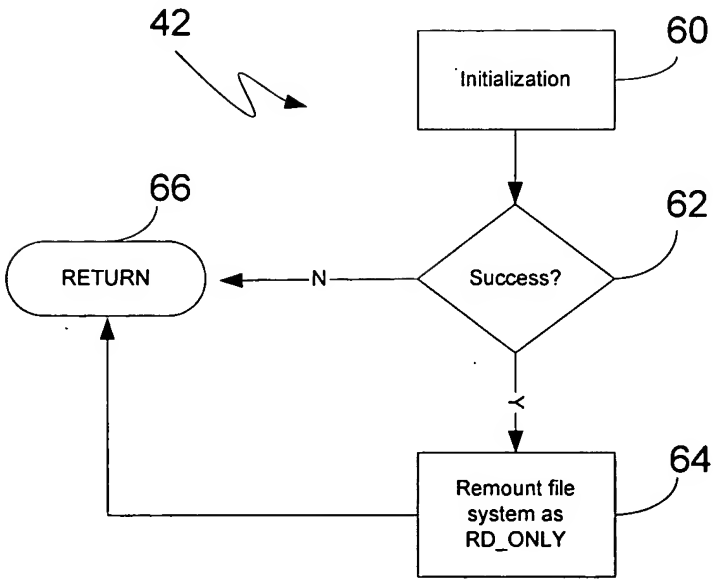

FIG. 6

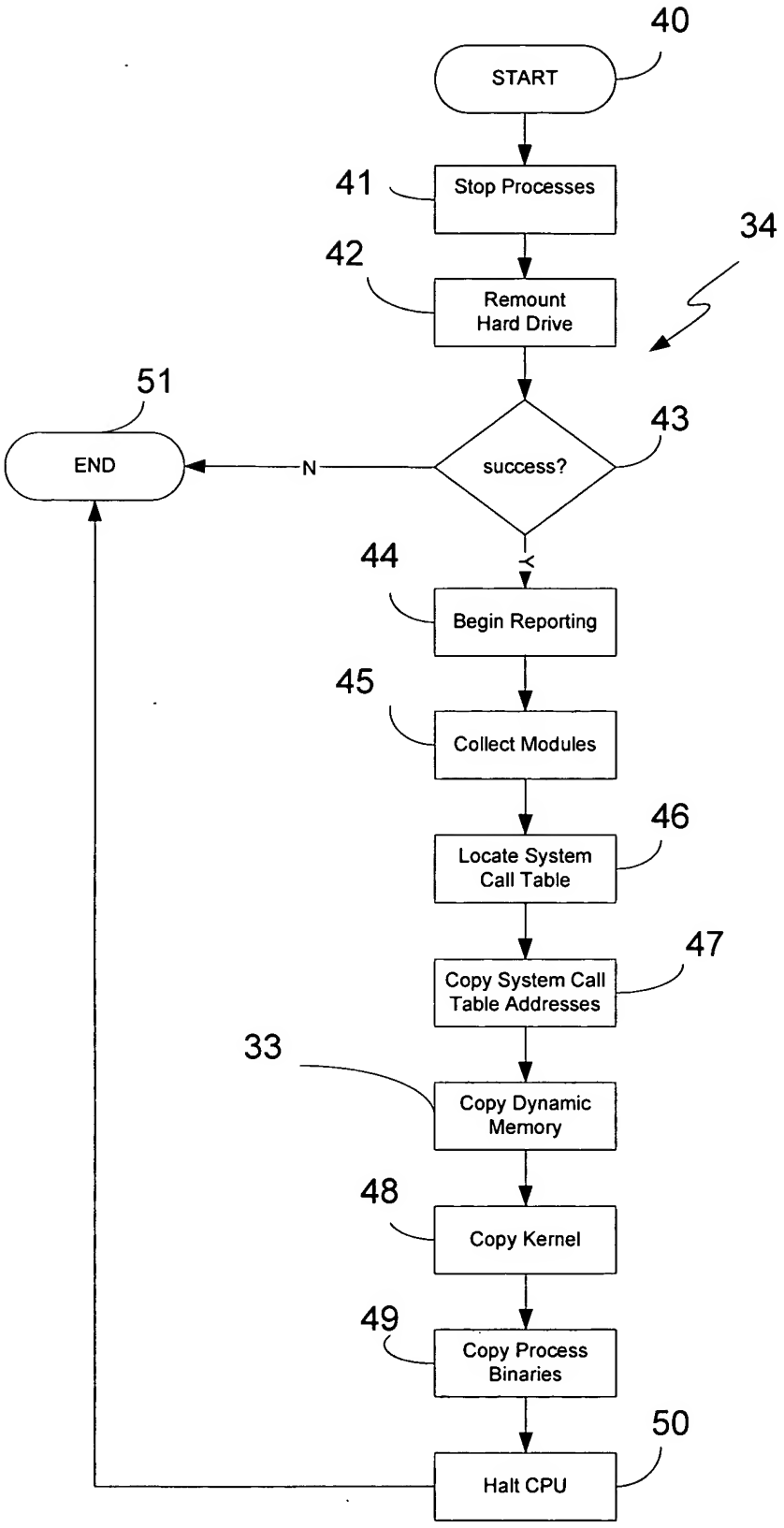
40
START
41
Stop Processes
42
Remount Hard Drive
34
51
END
N
43
success?
44
Begin Reporting
45
Collect Modules
46
Locate System Call Table
47
Copy System Call Table Addresses
33
Copy Dynamic Memory
48
Copy Kernel
49
Copy Process Binaries
50
Halt CPU

FIG. 4(a)

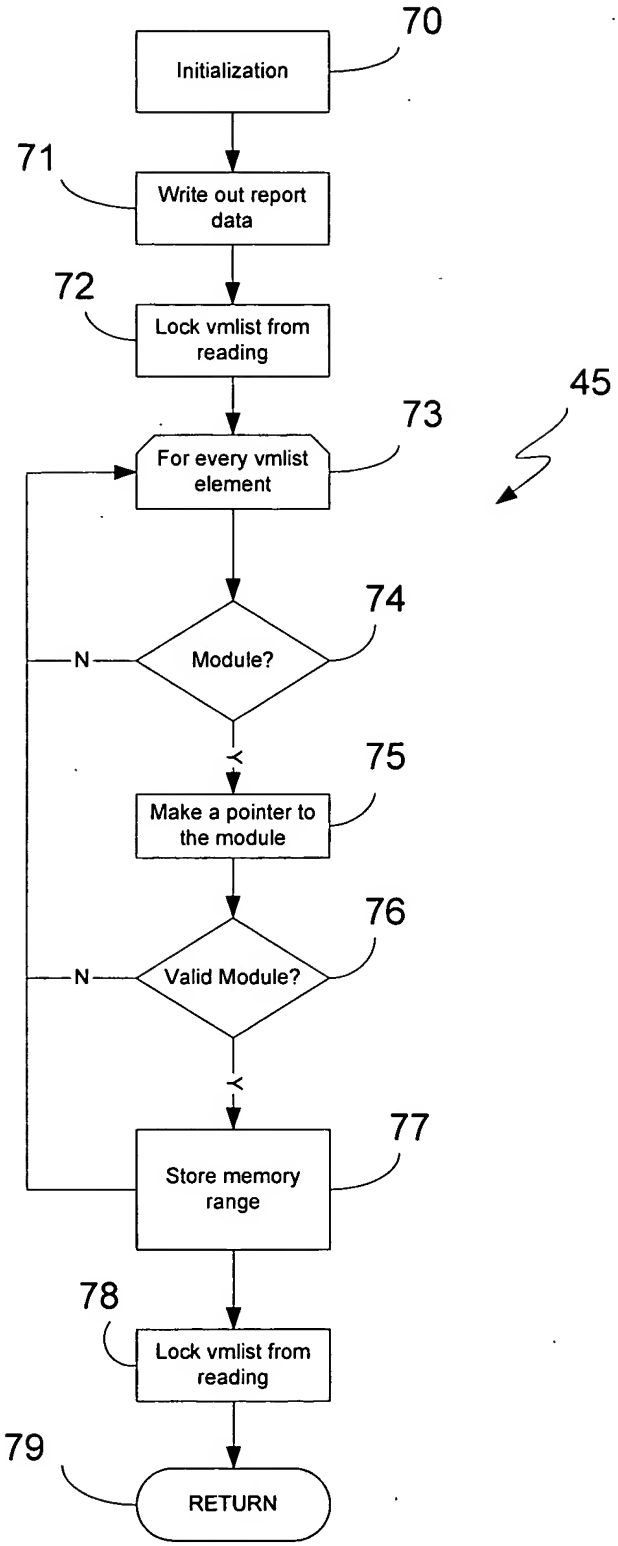
70
Initialization
71
Write out report data
72
Lock vmlist from reading
45
73
For every vmlist element
74
N
Module?
75
Make a pointer to the module
76
N
Valid Module?
77
Store memory range
78
Lock vmlist from reading
79
RETURN

FIG. 7(a)

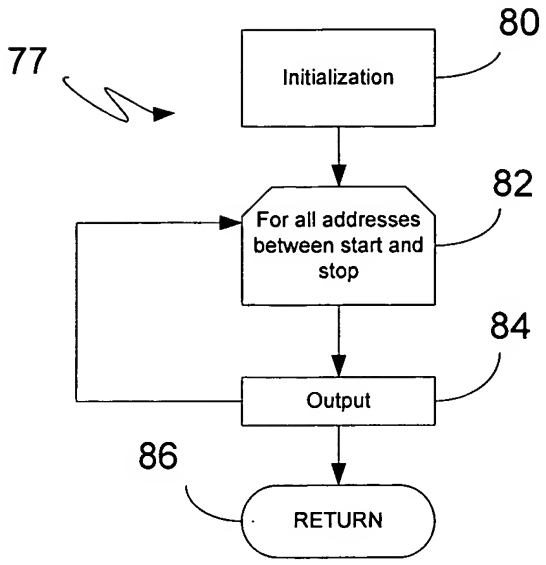

FIG. 8

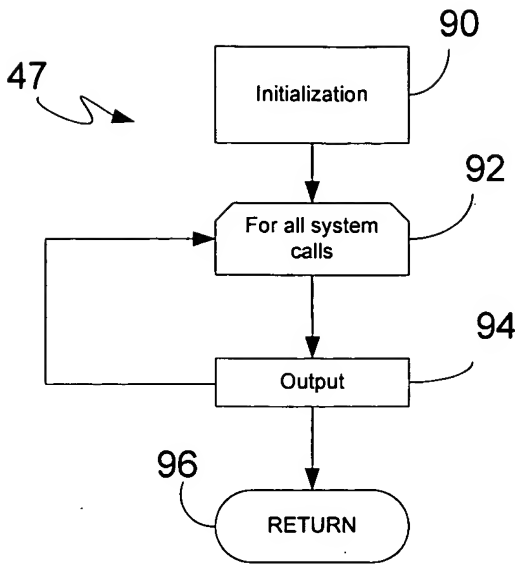

FIG. 9(a)

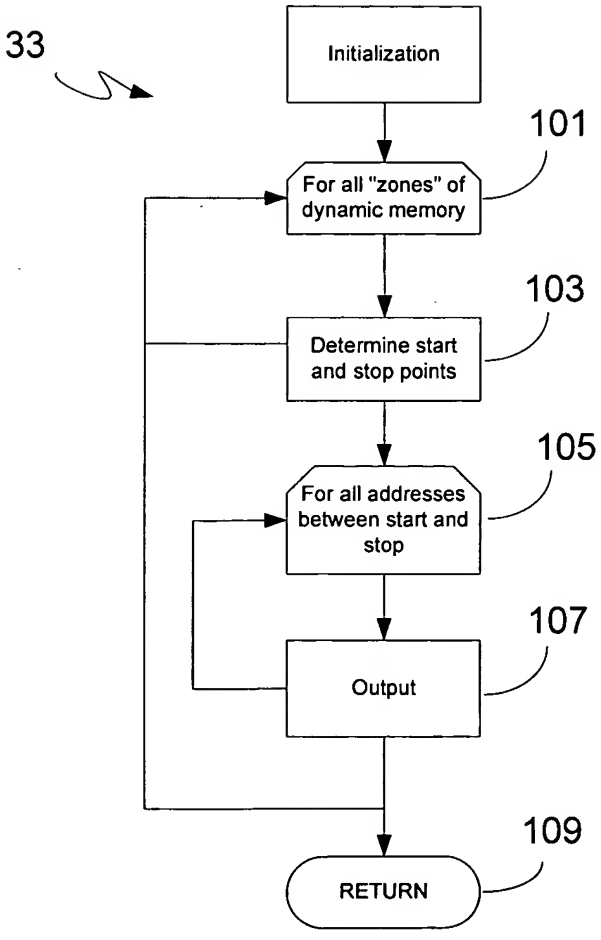

FIG. 10(a)

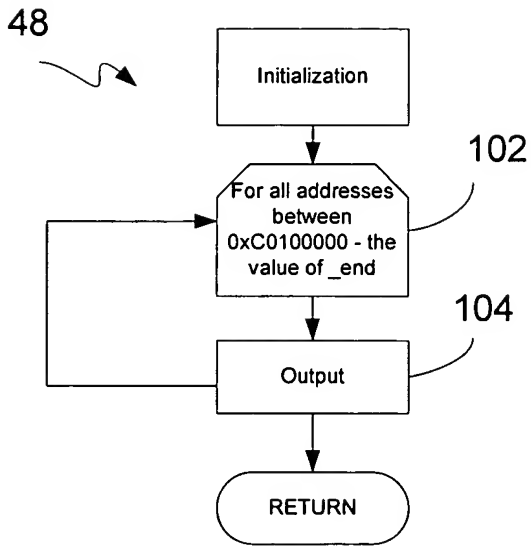

FIG. 10(c)

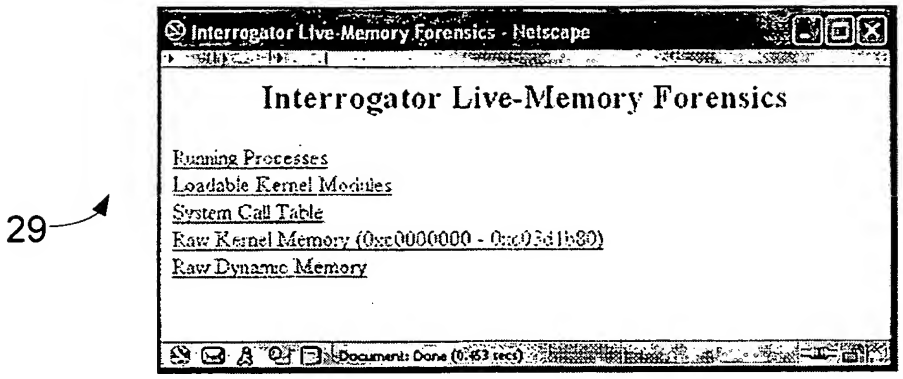
Interrogator Live-Memory Forensics - Netscape
Interrogator Live-Memory Forensics
Running Processes
Loadable Kernel Modules
System Call Table
Raw Kernel Memory (0xc0000000 - 0xc03d1b80)
Raw Dynamic Memory
Document: Done (0.463 secs)
27
29

FIG. 4(b)

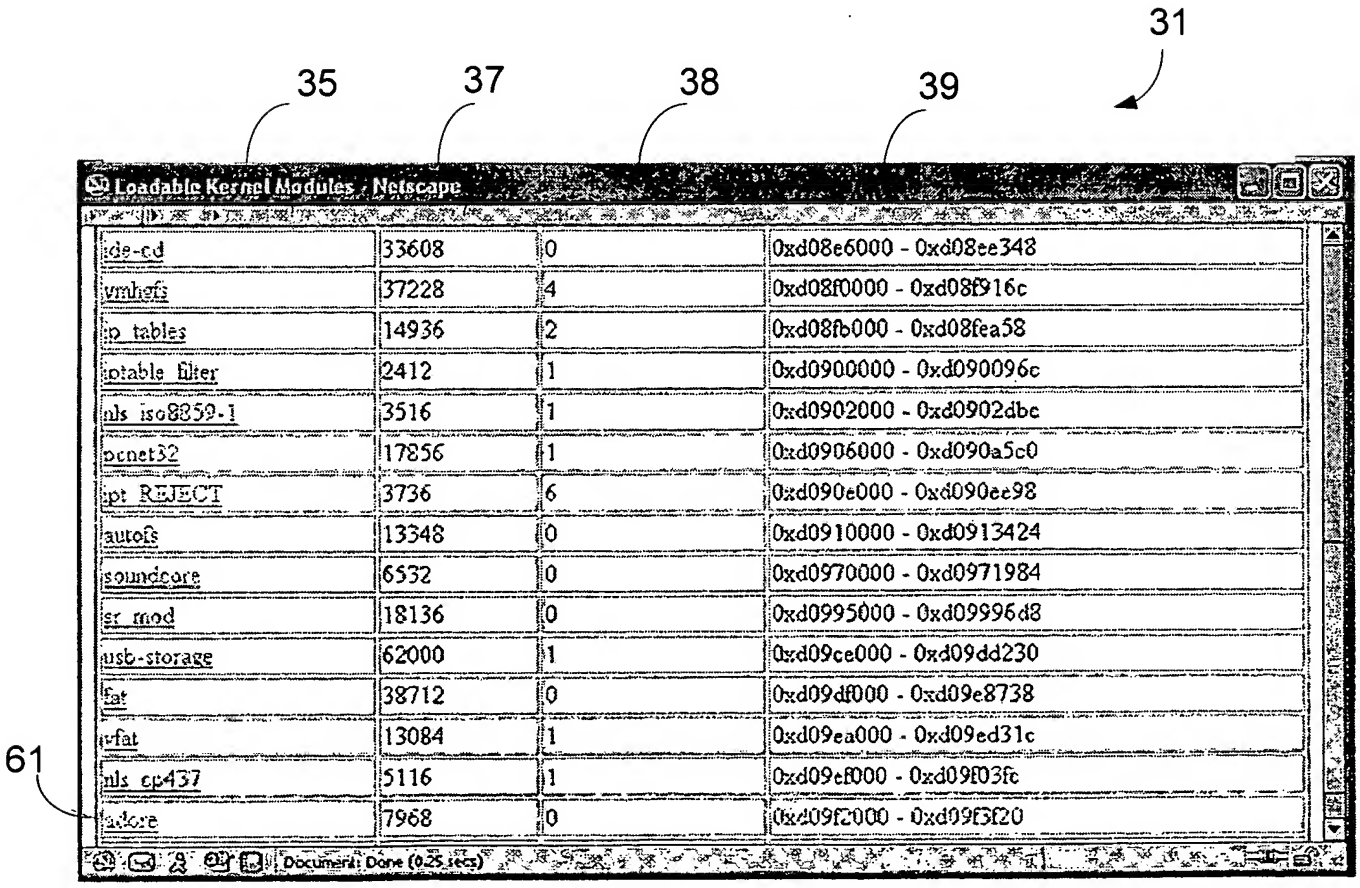
31
35
37
38
39
Loadable Kernel Modules - Netscape
ide-cd 33608 0 0xd08e6000 - 0xd08ee348
vmhgfs 37228 4 0xd08f0000 - 0xd08f916c
ip_tables 14936 2 0xd08fb000 - 0xd08fea58
iptable_filter 2412 1 0xd0900000 - 0xd090096c
nls_iso8859-1 3516 1 0xd0902000 - 0xd0902dbc
pcnet32 17856 1 0xd0906000 - 0xd090a5c0
ipt_REJECT 3736 6 0xd090e000 - 0xd090ee98
autofs 13348 0 0xd0910000 - 0xd0913424
soundcore 6532 0 0xd0970000 - 0xd0971984
sr_mod 18136 0 0xd0995000 - 0xd09996d8
usb-storage 62000 1 0xd09ce000 - 0xd09dd230
fat 38712 0 0xd09df000 - 0xd09e8738
vfat 13084 1 0xd09ea000 - 0xd09ed31c
nls_cp437 5116 1 0xd09ef000 - 0xd09f03fc
adore 7968 0 0xd09f2000 - 0xd09f3f20
Document: Done (0.25 secs)
61

FIG. 7(b)

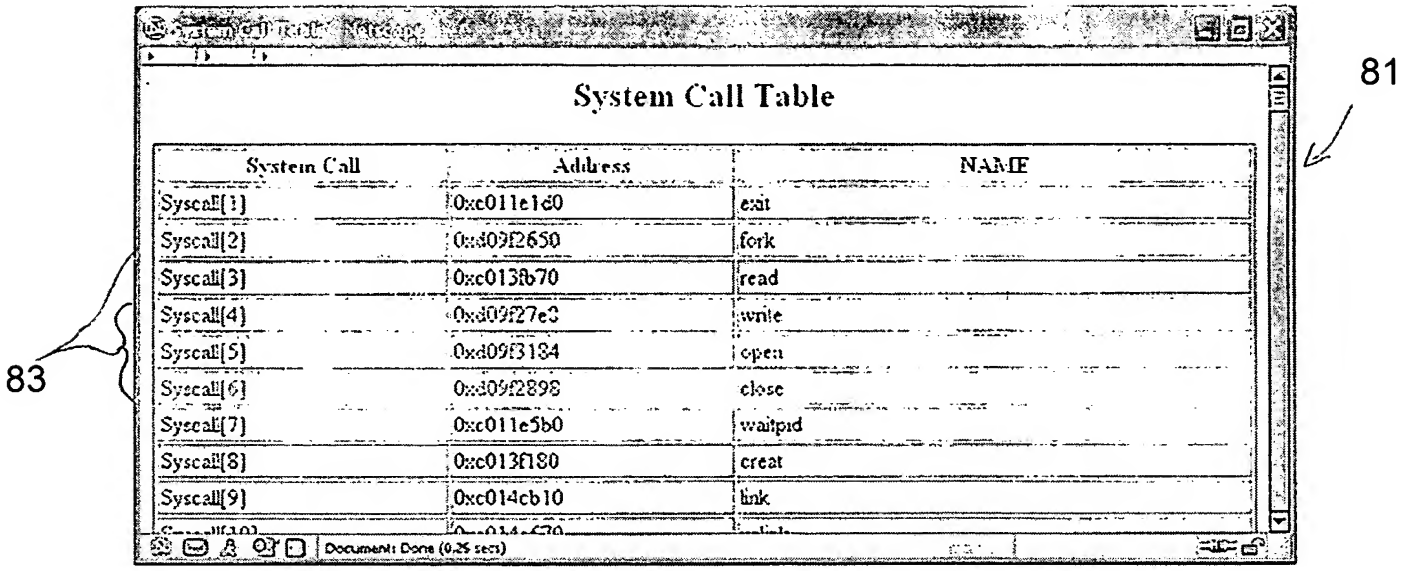

FIG. 9(b)

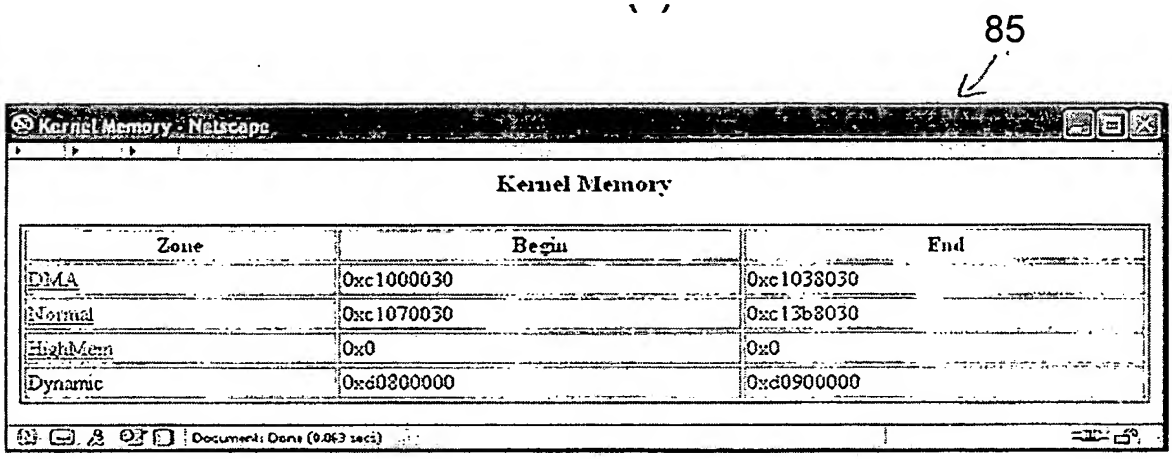

FIG. 10(b)

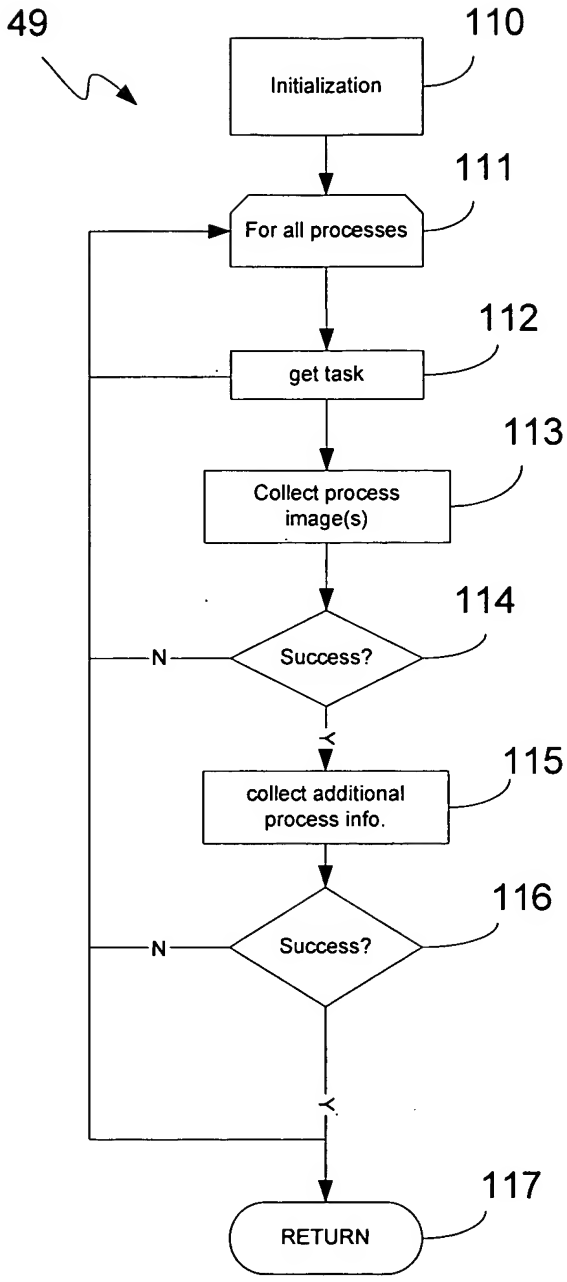

FIG. 11(a)

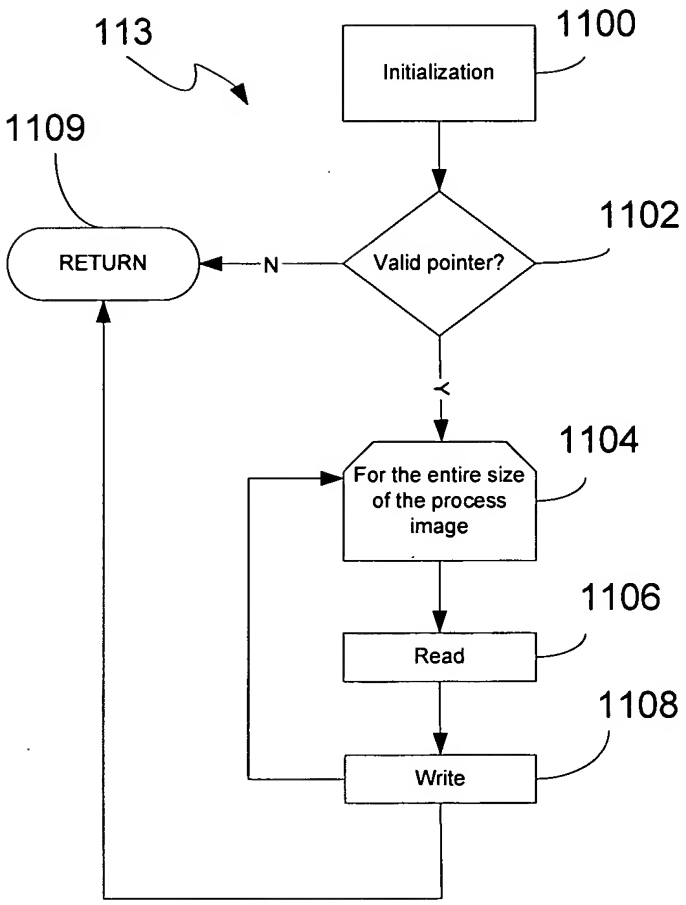

FIG. 11(b)

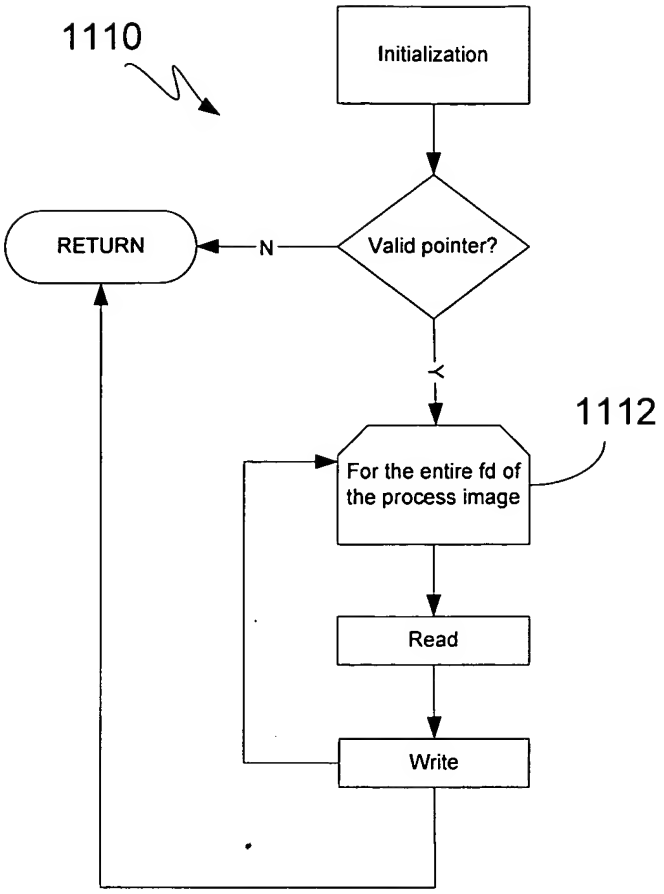

FIG. 11(c)

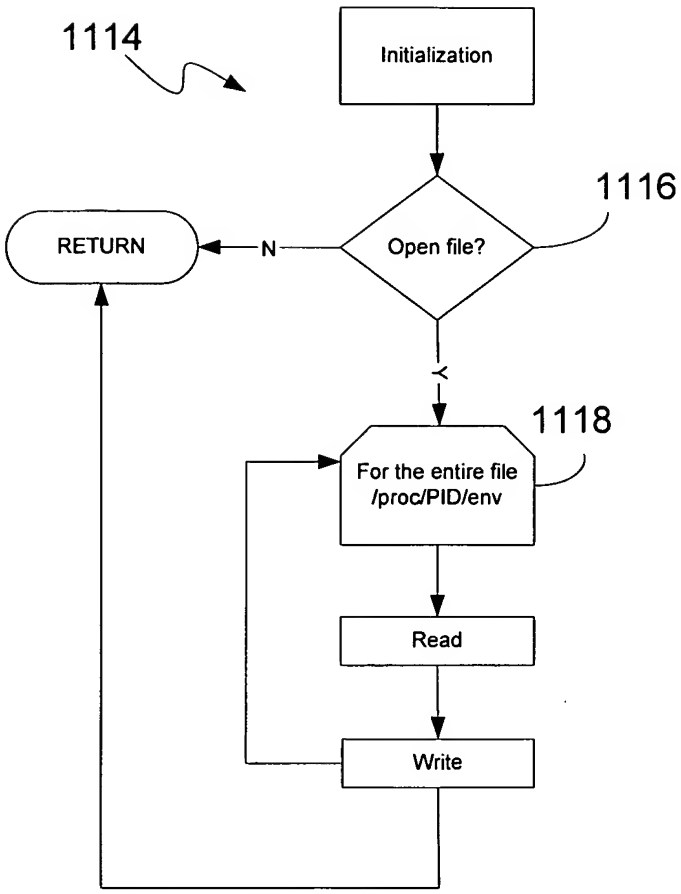

FIG. 11(d)

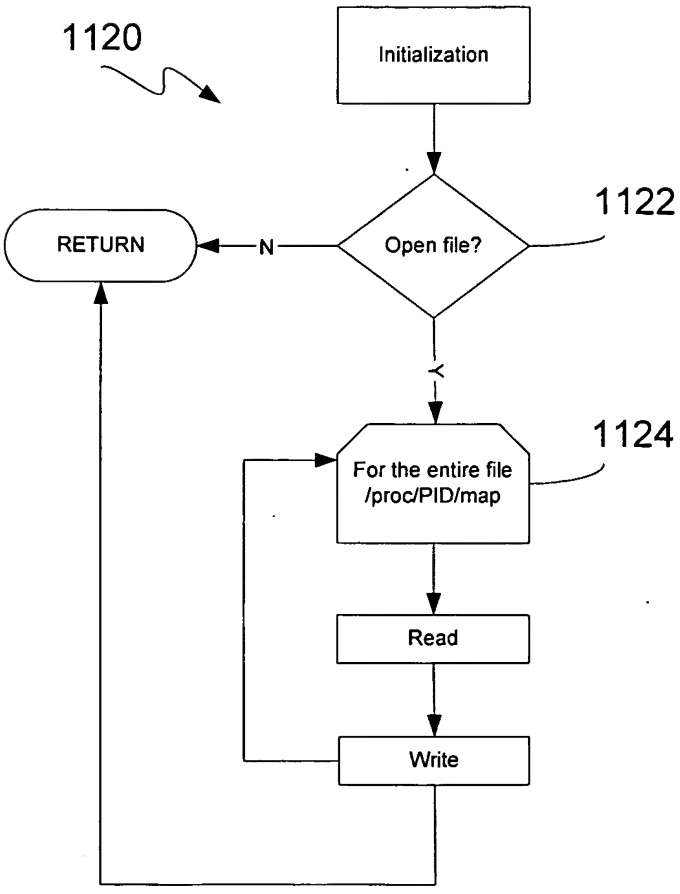

FIG. 11(e)

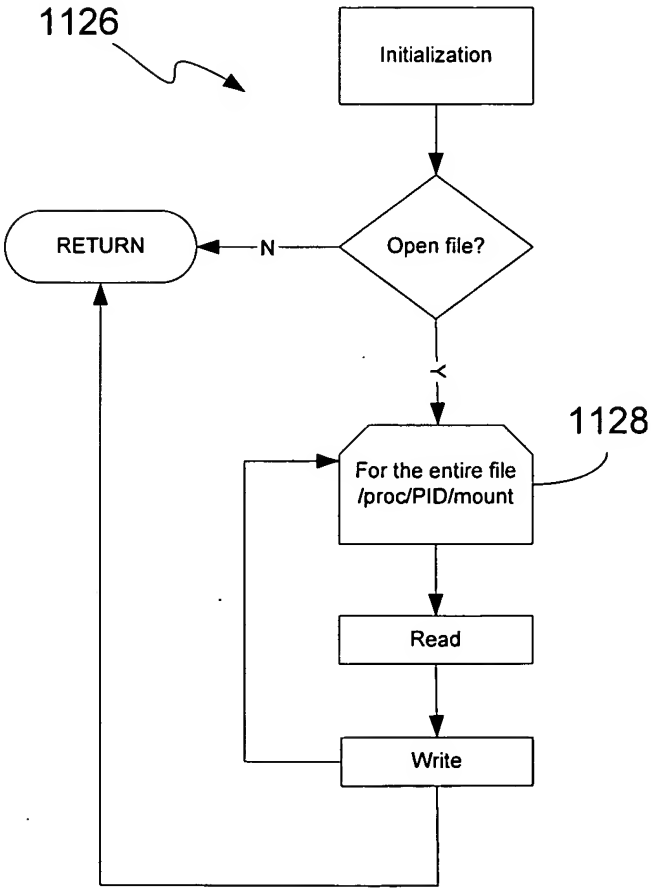

FIG. 11(f)

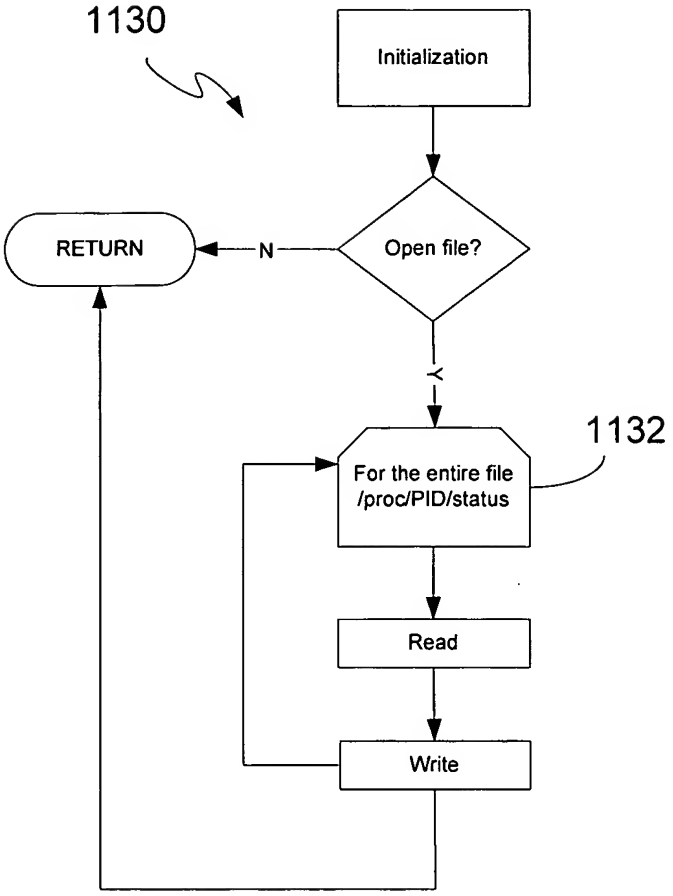

FIG. 11(g)

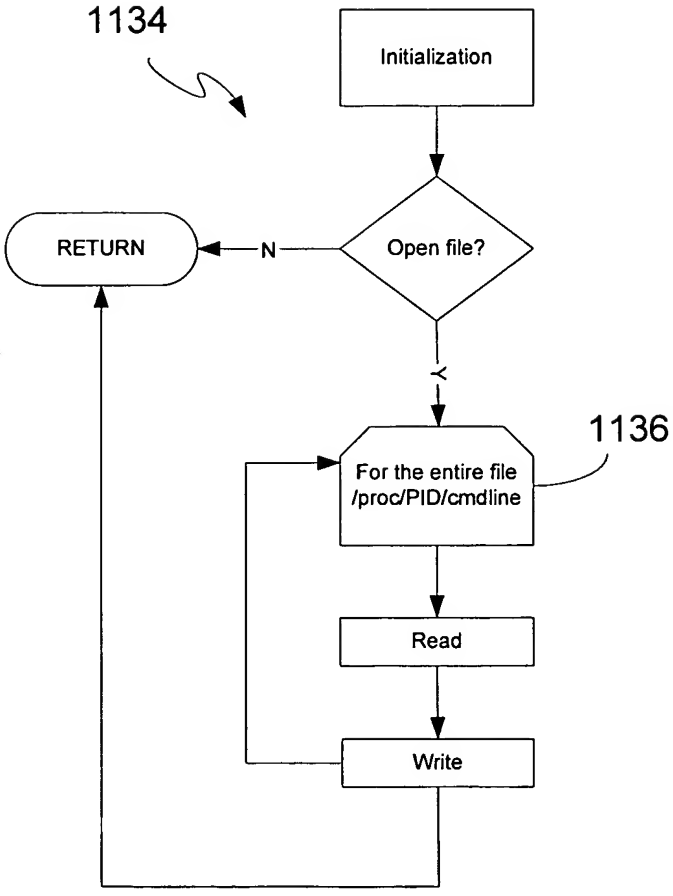

FIG. 11(h)

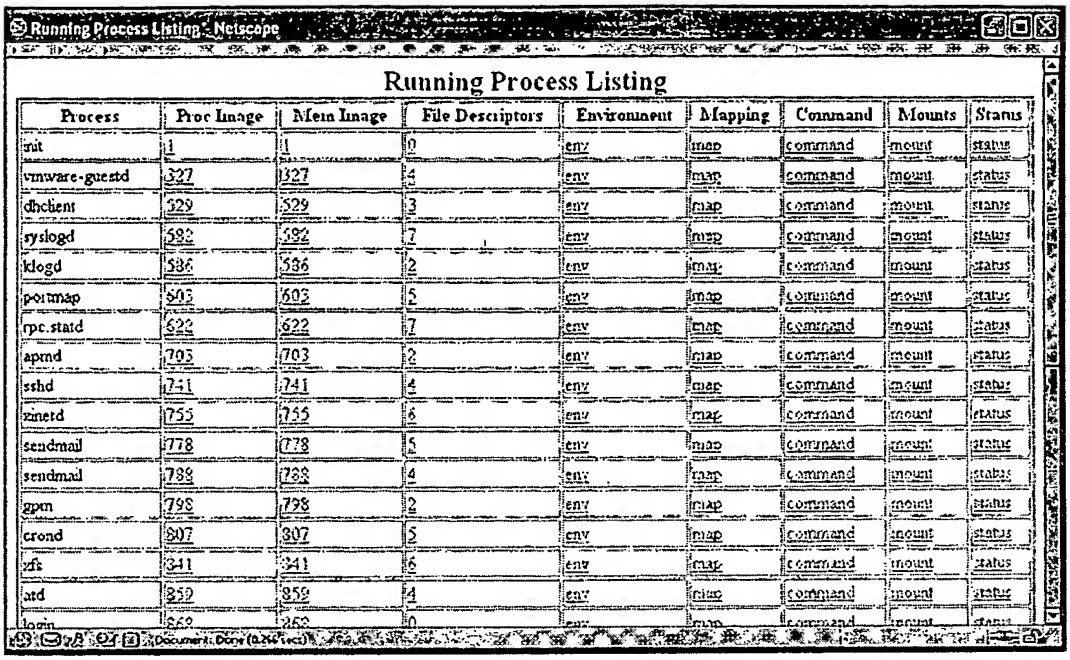

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FIG. 11(i)

```
total 13696
drwxr-xr-x    2 root     root         4096 Jan  5 19:41 .
drwxr-xr-x   11 root     root         4096 Jan  5 22:26 ..
-rwxr-xr-x    1 root     root        33960 Jan  5 19:40 1.exe
-rwxr-xr-x    1 root     root        33960 Jan  5 19:40 1.mem_exe
-rwxr-xr-x    1 root     root       103165 Jan  5 19:40 327.exe
-rwxr-xr-x    1 root     root       103165 Jan  5 19:40 327.mem_exe
-rwxr-xr-x    1 root     root       390950 Jan  5 19:40 529.exe
-rwxr-xr-x    1 root     root       390950 Jan  5 19:40 529.mem_exe
-rwxr-xr-x    1 root     root        33635 Jan  5 19:40 582.exe
-rwxr-xr-x    1 root     root        33635 Jan  5 19:40 582.mem_exe
-rwxr-xr-x    1 root     root        28571 Jan  5 19:40 586.exe
-rwxr-xr-x    1 root     root        28571 Jan  5 19:40 586.mem_exe
-rwxr-xr-x    1 root     root        40144 Jan  5 19:40 603.exe
-rwxr-xr-x    1 root     root        38147 Jan  5 19:40 603.mem_exe
```

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FIG. 12(a)

```
fd: 0 READ-WRITE /socket:/[1103]
fd: 1 WRITE-ONLY /var/log/messages
fd: 2 WRITE-ONLY /var/log/secure
fd: 3 WRITE-ONLY /var/log/maillog
fd: 4 WRITE-ONLY /var/log/cron
fd: 5 WRITE-ONLY /var/log/spooler
fd: 6 WRITE-ONLY /var/log/boot.log
```

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FIG. 12(b)

```
SSH_AGENT_PID=4606
HOSTNAME=sring-1.internal.vlan.iwc.sytexinc.com
PVM_RSH=/usr/bin/rsh
SHELL=/bin/bash
TERM=xterm
HISTSIZE=1000
GTK_RC_FILES=/etc/gtk/gtkrc:/root/.gtkrc-1.2-gnome2
WINDOWID=27270368QTDIR=/usr/lib/qt-3.1
USER=root
LS_COLORS=
PVM_ROOT=/usr/share/pvm3
SSH_AUTH_SOCK=/tmp/ssh-XX3Bs0yB/agent.4542
SESSION_MANAGER=local/sring-1.internal.vlan.iwc.sytexinc.com:/tmp/.ICE-
unix/4542
USERNAME=root
MAIL=/var/spool/mail/root
PATH=/usr/kerberos/sbin:/usr/kerberos/bin:/usr/local/sbin:/usr/local/bin:/sbin
:/bin:/usr/sbin:/usr/bin:/usr/X11R6/bin:/root/bin:/usr/local/netscape
INPUTRC=/etc/inputrc
PWD=/root
XMODIFIERS=@im=none
LANG=en_US.UTF-8
LAMHELPFILE=/etc/lam/lam-helpfile
GDMSESSION=Default
SSH_ASKPASS=/usr/libexec/openssh/gnome-ssh-askpass
HOME=/root
SHLVL=2X
PVM_ROOT=/usr/share/pvm3/xpvm
GNOME_DESKTOP_SESSION_ID=Default
BASH_ENV=/root/.bashrc
LOGNAME=root
LESSOPEN=|/usr/bin/lesspipe.sh %s
DISPLAY=:0.0G_
BROKEN_FILENAMES=1
COLORTERM=gnome-terminal
XAUTHORITY=/root/.Xauthority_=/usr/bin/ssh
```

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FIG. 12(c)

```
rootfs / rootfs rw 0 0
/dev/root / ext3 ro 0 0
/proc /proc proc rw 0 0
usbdevfs /proc/bus/usb usbdevfs rw 0 0
/dev/sda1 /boot ext3 rw 0 0
none /dev/pts devpts rw 0 0
none /dev/shm tmpfs rw 0 0
none /mnt/hgfs vmware-hgfs rw,nosuid,nodev 0 0
/dev/sdb1 /mnt vfat rw 0 0
```

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FIG. 12(d)

```
Name:   vmware-guestd
State:  R (running)
Tgid:   327
Pid:    327
PPid:   1
TracerPid:      0
Uid:    0       0       0       0
Gid:    0       0       0       0
FDSize: 32
Groups:
VmSize:     1424 kB
VmLck:         0 kB
VmRSS:       444 kB
VmData:       48 kB
VmStk:         8 kB
VmExe:        84 kB
VmLib:      1252 kB
SigPnd: 0000000000000000
SigBlk: 0000000000000000
SigIgn: 8000000000000000
SigCgt: 0000000000004a07
CapInh: 0000000000000000
CapPrm: 00000000fffffeff
CapEff: 00000000fffffeff
```

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FIG. 12(e)